What is claimed is:

1. A composition comprising:

at least one transition metal compound;

aluminum; and

a solution comprising at least one base or at least one electrolyte.

2. The composition of claim 1, wherein the transition metal compound is a compound of iron, ruthenium, osmium, cobalt, rhodium, iridium, nickel, palladium, platinum or combinations thereof.

3. The composition of claim 1, wherein the base is LiOH, NaOH, KOH, RbOH, CsOH, $Mg(OH)_2$, $Ca(OH)_2$, $Sr(OH)_2$, $Ba(OH)_2$, Na_2CO_3, K_2CO_3, CaO, or NH_3, or combinations thereof.

4. The composition of claim 1, wherein the base or the electrolyte is present in solution at a concentration from about 0.1 molar to about 5 molar.

5. The composition of claim 1, wherein the at least one transition metal compound is in solution.

6. The composition of claim 1, wherein the at least one transition metal compound is admixed with the aluminum.

7. A composition comprising:

at least one transition metal compound;

an alloy comprising aluminum and at least one high electron mobility component; and

a solution comprising at least one base or at least one electrolyte in contact with the alloy.

8. The composition of claim 8, wherein the transition metal compound is a compound of iron, ruthenium, osmium, cobalt, rhodium, iridium, nickel, palladium, platinum or combinations thereof.

9. The composition of claim 8, wherein the base is LiOH, NaOH, KOH, RbOH, CsOH, $Mg(OH)_2$, $Ca(OH)_2$, $Sr(OH)_2$, $Ba(OH)_2$, Na_2CO_3, K_2CO_3, CaO, or NH_3, or combinations thereof.

10. The composition of claim 8, wherein the at least one transition metal compound is in solution.

11. The composition of claim 8, wherein the at least one transition metal compound is admixed with the alloy.

12. The composition of claim 8, wherein the high electron mobility component is C, Si, Ge, Sn, AgBr, CdTe, HgSe, HgTe, AlAs, GaAs, GaSb, InP, InAs, InSb, SiC, $ZnSiP_2$, $CdSiP_2$, $CdSnAs_2$, $CdIn_2Te_4$, $Hg_5In_2Te_8$, PbSe, PbTe, Bi_2Te_3, or Te, or combinations thereof.

13. The composition of claim 8, wherein the at least one high electron mobility component is provided in an amount from about 1% to about 95% of the alloy by weight.

14. A method of producing hydrogen gas comprising the steps of:

providing the composition of claim 1, wherein the at least one base is in aqueous solution; and

contacting the aluminum with the aqueous solution.

15. A method of producing hydrogen gas comprising the steps of:

providing the composition of claim 1, wherein the at least one base and the at least one transition metal compound are in aqueous solution; and

contacting the aluminum with the aqueous solution.

16. A method of producing hydrogen gas comprising the steps of:

providing the composition of claim 8, wherein the at least one base is in aqueous solution; and

contacting the alloy with the aqueous solution.

17. A method of producing hydrogen gas comprising the steps of:

providing the composition of claim 8, wherein the at least one base and the at least one transition metal compound are in aqueous solution; and

contacting the alloy with the aqueous solution.

18. A method of manufacturing the alloy of claim 8, comprising the steps of:

providing the aluminum and the at least one high electron mobility component as ingredients;

melting the ingredients to form a mixture; and

cooling the mixture until the mixture solidifies.

19. A battery comprising an anode, a cathode, and an electrolyte, wherein the anode and the electrolyte comprise the composition of claim 1.

20. A battery comprising an anode, a cathode, and an electrolyte, wherein the anode and the electrolyte comprise the composition of claim 8.

21. A capacitor comprising an anode in contact with a sample of carbon foam, a cathode, an electrolyte, and a dielectric, wherein the anode and the electrolyte comprise the composition of claim 1.

22. A capacitor comprising an anode in contact with a sample of carbon foam, a cathode, an electrolyte, and a dielectric, wherein the anode and the electrolyte comprise the composition of claim 8.

23. A fuel cell comprising an anode, a cathode, and an electrolyte, wherein the anode and the electrolyte comprise the composition of claim 1.

24. A fuel cell comprising an anode, a cathode, and an electrolyte, wherein the anode and the electrolyte comprise the composition of claim 8.

25. A fuel cell assembly comprising a hydrogen fuel cell and a hydrogen generator, wherein the hydrogen generator comprises the composition of claim 1 and water.

26. A fuel cell assembly comprising a hydrogen fuel cell and a hydrogen generator, wherein the hydrogen generator comprises the composition of claim 8 and water.